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Morphology of a Neotropical cladoceran *Alona dentifera* (Sars, 1901), and its position within the Chydoridae Stebbing, 1902 (Branchiopoda: Anomopoda)

Морфология неотропичческого ветвистоусого рачка *Alona dentifera* (Sars, 1901), и его систематическое положение в семействе Chydoridae Stebbing, 1902 (Branchiopoda: Anomopoda)

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KEY WORDS: Cladocera, Chydoridae, *Alona*, morphology, redescription, systematics, Neotropics

КЛЮЧЕВЫЕ СЛОВА: Cladocera, Chydoridae, *Alona*, морфология, переописание, систематика, Неотропики

ABSTRACT. The morphology of a Neotropical anomopod, *Alonella dentifera* Sars, 1901, was studied in detail. Our investigation of the trunk limb morphology and the head pores in this species revealed that it belongs to the subfamily Aloninae Dybowski & Grochowski, 1894 emend. Frey, 1967, instead of Chydorinae Stebbing, 1902, as it was presumed by many previous authors. As a result, we transfer this species to the genus *Alona* Baird, 1843. We also found that another Neotropical taxon, *Alonella brasiliensis* Bergamin, 1935 is a junior synonym of *A. dentifera*. This species has several outstanding characters, i. e., it is a sole species of Aloninae lacking both major and lateral head pores. A preliminary position of *Alona dentifera* (Sars, 1901) within the subfamily is discussed.

РЕЗЮМЕ. Детально изучена морфология неотропического ветвистоусого рачка *Alonella dentifera* Sars, 1901. Полученные данные по строению грудных ног и головных пор показали, что этот вид принадлежит к подсемейству Aloninae Dybowski & Grochowski, 1894 emend. Frey, 1967, а не к подсемейству Chydorinae Stebbing, 1902, как предполагали ранее многие авторы. Мы переносим данный вид в род *Alona* Baird, 1843. Также нами обнаружено, что другой неотропический таксон, *Alonella brasiliensis* Bergamin, 1935 является младшим синонимом *A. dentifera*. Изученный вид обладает рядом необычных признаков, например, это единственный вид подсемейства Aloninae, у которого одновременно отсутствуют и главные, и латеральные головные поры. Обсуждается систематическое положение вида *Alona dentifera* (Sars, 1901) внутри подсемейства.

Introduction

An American cladoceran *Alonella dentifera* Sars, 1901 was described from the vicinity of São Paulo, Brazil, and subsequently found in other South [Daday, 1905; Martínez de Ferrato, 1966], Central [Frey, 1982; Smirnov, 1988] and North American [Dodds, 1926] countries. The taxon, which was regarded as a member of the family Chydoridae Stebbing, 1902, was never reinvestigated in detail, and Korovchinsky [1996] did not list it among adequately described species.

A second, quite similar taxon, *Alonella brasiliensis* Bergamin, 1935 was described subsequently from the same region, the vicinity of São Paulo. Our comparison of Sars' [1901] and Bergamin's [1935] descriptions did not reveal any significant differences between these two taxa. Later, Bergamin [1941] reported *A. dentifera* from the same locality, but he never discussed differences between *Alonella brasiliensis* and *Alonella dentifera*. We did not find any information on the current whereabouts of Bergamin's collection, type material of *A. brasiliensis* is most probably lost. The validity of *A. brasiliensis* as a species is doubtful (see under Discussion).

Despite this, the name *A. brasiliensis* was applied to specimens from other regions of Brazil [Bergamin, 1939; Smirnov, 1984], Venezuela [Rey & Vasquez, 1986], Nicaragua [Smirnov, 1988] and Mexico [Elías-Gutiérres et al., 2001]. Most authors used only minor differences in the shape and armament of postabdomen and in the shape of posteroventral denticles of valves as distinctive characters of this form. Smirnov [1988] compared specimens from Nicaragua with Sars' type material and found that the latter have larger marginal denticles on the postabdomen, a somewhat different shape of labral keel, and different structure of the postero-ventral denticles on the valves. According to modern standards of Chydoridae systematics, these characters are not enough for the independent status of *A. brasiliensis*.

Previous chydorid investigators [Smirnov, 1984; Rey & Vasquez, 1986] said that *A. brasiliensis* has several characters, untypical for a representative of *Alonella* Sars, 1862, *i. e.*, only two IDL setae, no major and lateral head pores, and head shield with broadly rounded anterior margin. In contrast, typical species of *Alonella* have three IDL setae, well-developed head pores, and the central part of the anterior margin of the head shield projected as the rostrum [Smirnov, 1971, 1996]. The shape of postabdomen and postabdominal claw of both *A. dentifera* and *A. brasiliensis* is also different from any other species of this genus.

These observations made the position of the *Alonella dentifera-brasiliensis* group within the genus *Alonella* doubtful, and Smirnov [1996] allocated *Alonella dentifera* to the genus *Alona.* There is also no obvious evidence that this taxon even belongs to the subfamily Chydorinae Stebbing, 1902. Finally, Elías-Gutiérres et al. [2001] found two connected major head pores in juveniles of *A. brasiliensis* from Mexico, so, its non-chydorine status became clearer.

Our aim was to study detailed morphology of *A. dentifera* Sars, 1901 using type material, to determine its taxonomic position within the family, and to elucidate the taxonomic status of *A. brasiliensis* Bergamin, 1935.

Material and Metods

The animals were selected from samples under a binocular stereoscopic microscope, placed on slides (in a drop of a glycerol-formaldehyde mixture) and studied under optical microscope *in toto*. Several specimens from each population were dissected for analysis of appendages. Measurements were conducted using an eyepiece-micrometer, all drawings were made with *camera lucida*. The system of numeration of the setae on the thoracic limbs of Kotov [2000a, b] was used.

ABBREVIATIONS. *In the list of material*: ZMOU — Zoological Museum of Oslo University; NNS - collection of Prof. N.N. Smirnov, now at the Zoological Museum of Moscow State University; AAK — personal collection of A. A. Kotov; NMK — personal collection of N. M. Korovchinsky.

In illustrations and text: I–V — thoracic limbs I-V; acs — accessory seta of limb I; dag — distal armature of gnathobase; epp — epipodite; ext — exopodite; fpl — filter plate; IDL — inner distal lobe of limb I; IP — interpore distance (distance between anterior and posterior major head pores); ODL — outer distal lobe of limb I; pep — preepipodite; PP — postpore distance (distance between posterior head pore and posterior corner of head shield); sos — soft setae.

Results

Alona dentifera (Sars, 1901)
Figs 1–39.

Alonella dentifera Sars, 1901: 61–62, Pl. 10: Figs 4, 4a; Daday, 1905: 162–163, Pl. 10: Figs 10, 11; Dodds, 1926: 23; Bergamin, 1939: 63 (like *A. dentifera* Daday, 1898, error); Bergamin, 1941: 165, Fig. 5; Martínez de Ferrato, 1966: 398, Pl. 1: Figs 1, 2; Smirnov, 1971: 270, Figs 278, 279; Frey, 1982: 180; Smirnov, 1988: 72, Figs 20–27; Elmoor-Loureiro, 1998: 26; Elmoor-Loureiro, 2000: Table 1.

Alona dentifera (Sars, 1901) in Smirnov, 1996: 95, Figs 354–358.

Alonella brasiliensis Bergamin, 1935: 284–285, Figs 1, 2; Bergamin, 1939: 63; Smirnov, 1984: 157, 158, Figs 8–14; Rey & Vasquez, 1986: 148–150, Pl. 5: Figs 1–12; Smirnov, 1988: 72, Figs 16–19, 19A; Smirnov, 1996: 95, 96, Figs 359–365; Elmoor-Loureiro, 1998: 26; Elmoor-Loureiro, 2000: Table 1; Elías-Gutiérrez et al., 2001: 50, 52, Figs 36–39.

Not *Alona dentifera* in Frey, 1959: 38, Figs 45, 46; Frey, 1962: Figs 45, 46; Goulden, 1966 : 100, Pl. 2, Fig. 6; Smirnov & Santos-Silva, 1995: 230, Fig. 9–19.

Not *Alona* cf. *dentifera* (Sars, 1901) in Idris & Fernando, 1981: 247, 248, Figs 52–56.

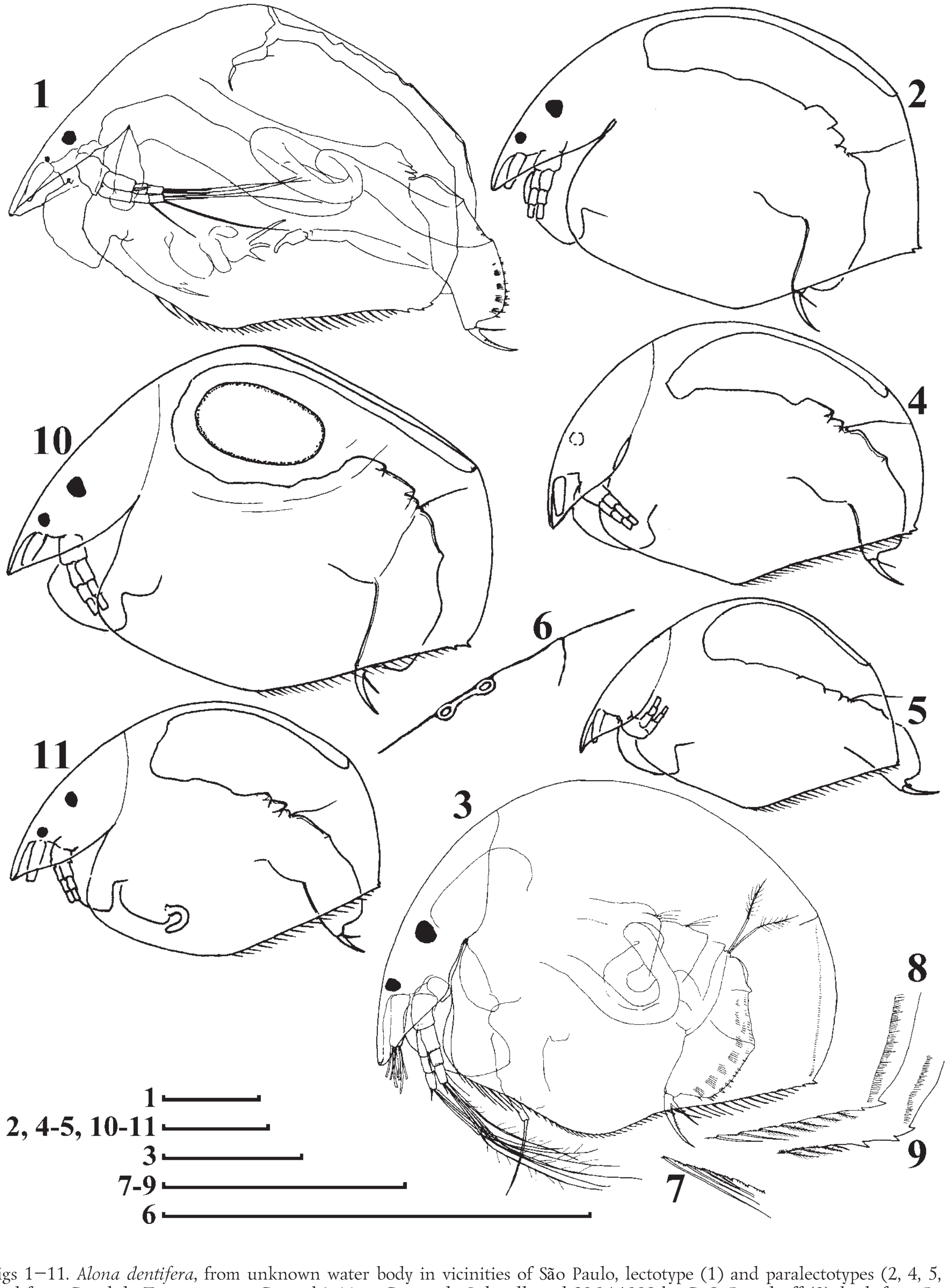
Type locality: "neighbourhood of São Paulo", State of São Paulo, Brazil.

Lectotype: parthenogenetic ♀, ZMOU F12341a, selected by D. Frey.

Paralectotypes: 5 parthenogenetic ♀♀, ZMOU F12341b; 1 parthenogenetic ♀ ZMOU, slide F12341c.

In addition to specimens already marked by D. G. Frey as lectotype and paralectotypes, more specimens of *A. dentifera* from São Paulo were found during the study of unsorted Sars' samples and slides, labelled as "Lynceidae from São Paulo". All these specimens were apparently seen by G. O. Sars, and are members of the type series according to paragraph 72.1.1. of ICZN (2000). They include: 4 parthenogenetic ♀♀, 1 instar I juvenile ♀, ZMOU, F12386g; 2 instar II juvenile ♀, ZMOU, slide F12386q; 2 parthenogenetic ♀♀, instar II juvenile #, ZMOU, slide F9130; 6 parthenogenetic ♀♀, ephippial ♀, ZMOU, slide F9131; 2 parthenogenetic ♀♀, ephippial ♀, ZMOU, slide F9131.

OTHER MATERIAL EXAMINED. 2 parthenogenetic ♀♀ from Canal do Tamengo near the city of Corumbá, the outflow of the large floodplain lake Lagoa de Cáceres on the Bolivian side, Pantanal, Mato Grosso do Sul, Brazil, coll. 29.04.1998 by G.-O. Brandorff, NMK 2294; 5 parthenogenetic ♀♀ from lower reaches of Rio Nhamundá, Pará, Brazil, coll. 21.09.1975 by G.-O. Brandorff, NNS 1997-162 and NNS 1997-244, slide NNS 0419; 1 parthenogenetic ♀ from Ilha de Maracá, near Boa Vista, Roraima Brazil, coll. 22.06.1987 by B. Robertson & E. N. Santos Silva, NNS 2000-093; 2 parthenogenetic ♀♀ from a bay of Lake Nicaragua, Nicaragua, coll. 07.02.1985 by N. N. Smirnov, AAK 2002-110, slide NNS 3487.



Figs 1–11. *Alona dentifera*, from unknown water body in vicinities of São Paulo, lectotype (1) and paralectotypes (2, 4, 5, 10, 11), and from Canal do Tamengo near Corumbá, Mato Grosso do Sul, collected 29.04.1998 by G.-O. Brandorff (3), both from Brazil: 1–2 — adult ♀; 3 — small adult ♀; 4 — instar II juvenile ♀; 5–6 — instar I juvenile ♀ and its dorsal head pores in lateral view; 7 — setae at anterior portion of valve in adult ♀; 8–9 — postero-dorsal portion of valve in inner view; 10 — ephippial ♀; 11 — instar II juvenile ♂. Scale bar denotes 100 μm.

Рис. 1–11. *Alona dentifera*, из неизвестного водоема в окрестностях Сан–Паоло, лектотип (1) и паралектотипы (2, 4, 5, 10, 11), и из канала До Томенго около Корумба, штат Мато Гроссо ду Сул, собранная 29.04.1998 Г.-О. Брандорффом (3), Бразилия: 1–2 — взрослая ♀, 3 — небольшая взрослая ♀, 4 — ювенильная ♀ второго возраста, 5–6 — ювенильная ♀ второго возраста и ее головные поры, вид сбоку, 7 — щетинки передней части створок взрослой ♀, 8–9 — заднее-нижний угол створок взрослой ♀, вид изнутри; 10 — эфиппиальная ♀, 11 — ювенильный ♂ второго возраста. Масштаб 100 μm.

DIAGNOSIS. *Female:* Body ovoid, length about 1.3–1.4 times maximum height. Postero-ventral angle with 2–3 denticles. Head shield wide, its anterior and posterior margin broadly rounded. No major and lateral head pores in adults. Labrum large, with very short distal plate, labral keel wide, large, with a blunt apex.

Postabdomen of moderate length and height, slightly narrowing distally, length about maximum height. Basis of claws separated from distal margin by clear incision. Distal margin almost straight, distal angle broadly rounded. Dorsal margin with distal part about 3 times longer than preanal one, postanal portion 1.5 times longer than anal one. Preanal angle prominent, postanal angle well defined. Preanal margin from almost straight to weakly concave; 11–13 groups of marginal denticles. Postanal groups of 2–4 short and slender denticles, sometimes in smaller specimens 1–3 distalmost denticles single. Anal groups of 4–8 very small denticles. 8–10 lateral fascicles of thin setae, distal fascicles broad, with distal setule being longest, two times longer than largest marginal denticles. Postabdominal claw long and slender, longer than anal portion of postabdomen. Basal spine very long and slender, about 2/3 length of claw itself.

Antenna I elongated. Nine aestetascs of different length, longest of them approximately as long as antenna I. All aestetascs projecting beyond anterior margin of head shield. Antennal formula, setae 0–0–3/1–1–3, spines 1–0–1/0–0–1. Spine on basal segment of exopod longer than middle segment. Apical spines shorter than apical segments.

IDL of trunk limb I with rudimentary first seta, two other setae armed with long slender setules. Scrapers of limb II slightly differentiated in thickness. Exopodite of trunk limb III with six setae greatly different in length, seta 4 being longest. Exopodite IV with six setae, seta 4 being longest. Exopodite V with four setae. Epipodites IV and V with long finger-like projections. Trunk limb VI absent.

Length 0.32–0.48 mm.

Male unknown.

REDESCRIPTION. *General:* In lateral view body semicircular, high, juvenile female of same proportions as adults (Figs 1–5). Dorsal margin highly arched, postero-dorsal angle not defined, posterior margin of valves convex. A postero-ventral angle of valves visible due to presence of two-three denticles here, posteriormost frequently being largest, but without marginal setules (Figs 8, 9). A straight, vertical row of dense setules on the inner side of valves starts near base of the posteriormost denticle. Ventral margin in anterior part from weakly concave to weakly convex, in the middle significantly convex, and almost straight in the posterior part, with about 40 setae, anterior setae quite long (Fig. 7). No reticulation on head, reticulation on valves very obscure in adults.

Head of moderate size, in lateral view triangle-round, in lateral view its antero-ventral portion (rostrum) protruding downwards and slightly anteriorly. Compound eye large, ocellus about two times smaller than eye. Distance from the tip of rostrum to ocellus somewhat larger than that between ocellus and eye.

Head shield wide, maximum width behind mandibular articulation (Figs 16, 17), anterior margin broadly rounded, posterior margin triangular-round. Juvenile females of instar I with two major head pores with narrow connection between them, PP about 1.2 IP (Fig. 6). No major head pores in instar II juvenile females and in adults. No lateral head pores.

Labrum robust (Figs 12–15), with short, blunt lateral projections and small distal labral plate lacking of setulation. Labral keel large, broadly rounded, but with a blunt apex. Anterior margin of keel slightly undulated convex, posterior margin without setules.

Thorax and *abdomen* subequal in length, dorsal surface of abdominal segments not saddle-shaped. No abdominal projections. Each abdominal segment with one- two transverse rows of short setules.

Postabdomen (Figs 20–24) in general wide, somewhat narrowing distally, length about 1.3–1.5 times height, ventral margin straight or slightly concave. Dorsal margin with distal part about 3 times longer than preanal one, postanal portion 1.5 times longer than anal one. Preanal angle prominent, postanal angle well defined, as a triangle. Preanal margin from almost straight to weakly and regularly convex. Distal angle broadly rounded, distal margin well-expressed, almost straight, basis for claws separated from the latter by a clear incision.

Postabdomen provided distally with 11–13 groups of marginal denticles, size of denticles decreasing basally in each group. Among them, 7–8 postanal groups of 2–4 short and slender denticles, sometimes in smaller specimens 1–3 distalmost denticles are single, and 4-5 anal groups of 4–8 very small denticles. On sides of postabdomen, 8-10 lateral fascicles of long, fine setules, postanal fascicles broad, with distal setule being longest, two times longer than the largest marginal denticle; anal fascicles smaller, 3–5 additional small fascicles about the main row in region of anus.

Postabdominal claw (Figs 25, 26) long and slender, slightly longer than anal portion of postabdomen. Both ventral and dorsal margins of claw supplied with short setules, inner side of claws with two clusters of setules in basal portion, with a row of strong denticles in middle, and fine setules distally. Basal spine remarkably long, with length about 2/3 of claw length, its dorsal margin with short setules.

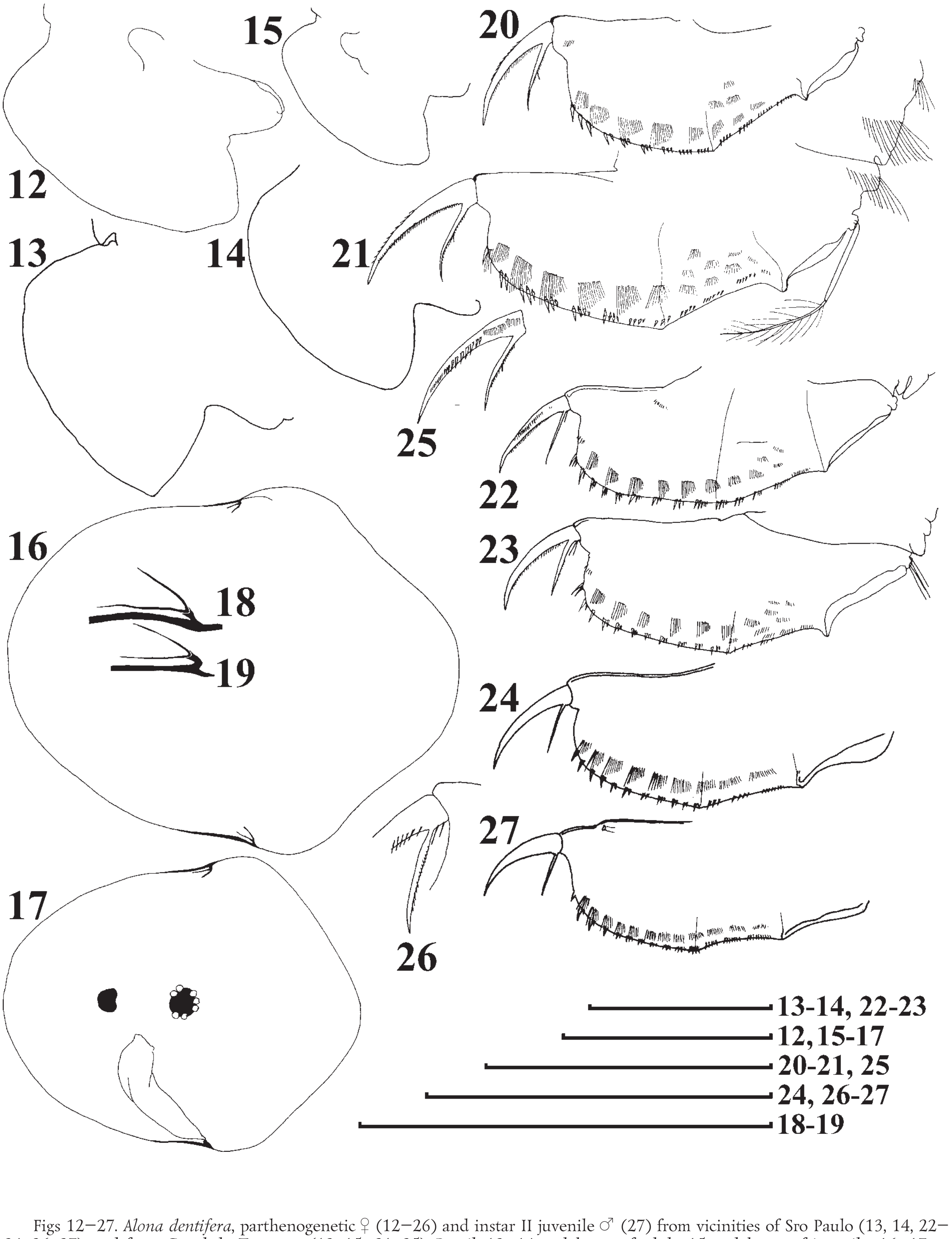
Antenna I (Fig. 28) of moderate size, relatively narrow, not reaching tip of rostrum, with 4 small clusters of setules at anterior face. Sensory seta thin, of about half length of antenna I, arising at 4/5 distance from the base. Nine aestetascs of different length, largest al long as antenna I. All aestetascs projecting beyond anterior margin of head shield.

Antenna II of moderate size (Figs 29, 30). Antennal formula, setae 0–0–3/1–1–3, spines 1–0–1/0–0–1. Coxal part as a concertina, with two sensory setae of equal length, basal segment robust, with very short seta arising from socle-like projection. Exopod somewhat shorter than endopod, all segments of both branches slender, cylindrical, basal segments 1.5 time longer than apical and middle segments. All apical swimming setae subequal in size, setulated distally, without chitinous insertions neat joins of basal and distal segments. Seta arising from basal segment of endopod thin, projecting beyond tip of distal segment. Seta arising from middle segment of endopod slightly shorter than apical setae. Spine on basal segment of exopod longer than middle segment. Spines from apical segments more than two times shorter than apical segments.

Mandible relatively short and wide. In contrast to previously described alonines, it is attached to a very short chitinous apophyse (projection), instead of point of the joint of head shield and valves (Fig. 18–19).

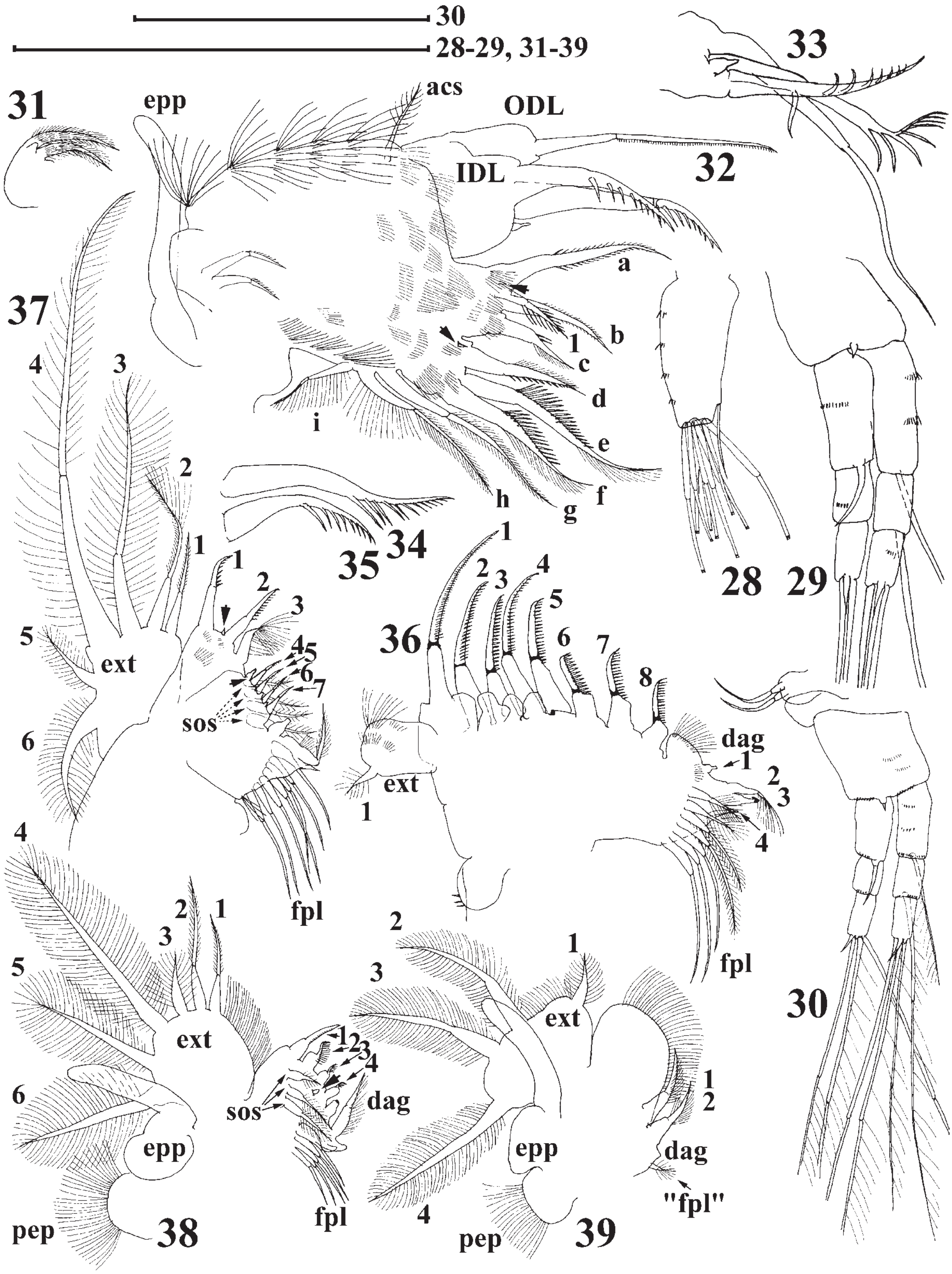
Maxilla (Fig. 31) with two densely setulated setae and hillock between their bases. *Maxilla II* absent.

Trunk limb I specially large as compared with other limbs (Fig. 32). Epipodite ovoid, with a finger-like projection three times longer than epipodite itself. Accessory seta (Fig. 32: *acs*) short, slender, setulated in distal part, three times shorter than ODL seta. ODL massive, with a single long, bi-segmented seta, its distal segment unilaterally armed with short setules. IDL larger than ODL (Fig. 33), its first seta rudimentary, second and third setae (Fig. 33–34) strong, each wide at base, armed with numerous relatively long but robust denticles in distal portion.



Figs 12–27. *Alona dentifera*, parthenogenetic ♀ (12–26) and instar II juvenile ♂ (27) from vicinities of Sro Paulo (13, 14, 22–24, 26, 27), and from Canal do Tamengo (12, 15–21, 25), Brazil: 12–14 — labrum of adult; 15 — labrum of juvenile; 16–17 — head shield of adult and juvenile; 18–19 — articulation of mandible; 20 — postabdomen of juvenile ♀; 21–24 — postabdomen of adult; 25–26 — postabdominal claw; 27 — postabdomen of instar II juvenile ♂. Scale bar denotes 100 µm.

Рис. 12–27. *Alona dentifera*, партеногенетические ♀ (12–26) и ювенильный самец второго возраста (27) из окрестностей Сан-Пауло (13, 14, 22–24, 26, 27) и из канала До Томенго (12, 15–21, 25), Бразилия: 12–14 — лябрум взрослой ♀; 15 — лябрум ювенильной ♀; 16–17 — головной щит; 18–19 — место прикрепления мандибулы; 20 — постабдомен ювенильной ♀; 21–24 — постабдомен взрослой ♀; 25–26 — коготок постабдомена, 27 — постабдомен ювенильного ♂ второго возраста. Масштаб 100 µm.



Figs 28–39. *Alona dentifera*, appendages of ♀♀ from vicinities of São Paulo (29, 33), and from Canal do Tamengo, (28, 30–32, 34–39), Brazil: 28 — antenna I; 29–30 — antenna II; 31 — maxilla I; 32 — limb I; 33–35 — IDL of limb I and two its setae; 36 — limb II; 37 — limb III; 38 — limb IV; 39 — limb V. Scale bar denotes 100 µm.

Рис. 28–39. *Alona dentifera*, конечности ♀♀ из окрестностей Сан-Пауло (29, 33) и из канала До Томенго (28, 30–32, 34–39), Бразилия: 28 — антенна I, 29–30 — антенна II, 31 — максилла I, 32 — нога I, 33–35 — внутренняя дистальная доля ноги I и ее щетинки, 36 — нога II, 37 — нога III, 38 — нога IV, 39 — нога V. Масштаб 100 µm.

Endite 3 with 3 soft setae of different size (a–c), distalmost seta (a) longer than others, anteriorly a single setulated seta 1. Endite 2 with three setae setulated in distal portions (d–f), seta e equal in length to longest IDL seta, a very short, naked sensillum at anterior face (thick arrow). Endite 1 with two bi-segmented setae (g–h), both setulated in distal part, and a flat, geniculated, setulated seta shifted to the limb base (I), no setae on anterior face of limb. Five rows of long setules on ventral face of limb. Two small slender ejector hooks, subequal in size.

Trunk limb II subtriangular (Fig. 36). Exopodite subrectangular, with a short seta and clusters of setules distally. Inner portion of limb ("endopodite") with eight scraping setae (1–8), all scrapers with well-developed denticles, size of denticles decreasing distally. Spines 6–8 shorter, subequal in length, spines 2–5 longer, seta 8 significantly longer than other. A portion of gnathobase bordering with "endopodite" with numerous hair-like setules. Distal armature of gnathobase with four elements (1–4). Filter plate with seven setae, two posteriormost setae subequal in length, considerably shorter then other.

Trunk limb III (Fig. 37): Exopodite rectangular, with six setae, subdivided into distal and basal groups. Seta 4 longest, length of setae 3 and 2 about 2/3 and 1/3 length of seta 3, other setae more than four times shorter than seta 4, seta 5 especially short. Setae 1–2 with short setules in distal part, others fully setulated with thin setules.

Distal endite with three setae, two distalmost members (1–2) long, robust, sharp, with denticles in distal part; basalmost seta (3) shorter, geniculated, with long setules. Small sensillum near base of seta 2. Basal endite with four stiff setae (4–7), increasing in size in basal direction, a bottle-shaped sensillum near seta 4. Gnathobase not clearly separated from basal endite. Four soft setae subequal in length. Distal armature of gnathobase with three elements: a thick, bottle-shaped sensillum, a geniculated, setulated seta, and short pointed spine. Filter plate III with seven setae.

Trunk limb IV (Fig. 38): pre-epipodite large, setulated; epipodite of irregular shape, with long finger-like projection two times longer than epipodite itself. Exopodite rounded, with six setae, divided into lateral and distal groups of three setae in each. Setae 4 being longest, setae 5, 6 and 2 subequal in length, about 2/3 of length of seta 4, seta 1 more than two times shorter than seta 4, seta 3 more than four times shorter than seta 4. Setae 3–6 flattened, plumose, setae 1–2 slender, bi-segmented, with short setules in distal part.

Inner portion of limb IV with four short, slender, flaming-torch marginal setae (1–4), a small sensillum (thick arrow), and three soft setae, and three soft setae increasing in size basally. Gnathobase with four elements, a bottle-shaped sensillum , a long bi-segmented seta, and two small hooks distally. Filter plate with five setae.

Trunk limb V (Fig. 39): pre-epipodite setulated, epipodite subovoid, with a finger-like projection two times longer than epipodite itself. Exopodite irregularly ovoid, not subdivided into lobes, with four plumose setae, their length gradually decrease from seta 4 to seta 1. Inner limb portion as a large, flat, subovoid flap, setulated at its inner margin. At inner face, two short setae with wide bases, setulated in distal portion. "Filter plate" with a single short seta.

Ephippial female (Fig. 10) with more high body than parthenogenetic one, ephippium with straight dorsal margin, without prominent sculpture.

Adult male unknown. Single juvenile male of instar II was found on one of Sars' slides. Body similar in shape to juvenile females of same instar, but smaller (Fig. 11). Postabdomen of same shape as in female (Fig. 27), ventral margin with clear notch in the region of gonopores, which open ventrally at one-third distance from the base of the claws. Postabdominal claw significantly shorter than that of female, but the length of basal spine same as in female.

SIZE. In instar I juvenile females, length about 0.32–0.33 mm, height about 0.23 mm In instar II juvenile females, length 0.37–0.39 mm, height 0.27–0.29 mm. In adult female, length 0.41–0.48 mm, height 0.30–0.37 mm. Length of single studied instar II juvenile male 0.37 mm, height 0.27 mm.

VARIABILITY. The main variable character of this species is armament of posteroventral angle of valves. Specimens with two and three denticles here were recorded, and size, shape and position of denticles varies greatly.

DIFFERENTIAL DIAGNOSIS. Present study of the species morphology revealed that *A. dentifera* belongs to the subfamily Aloninae Dybowski & Grochowski, 1894 emend. Frey, 1967. Species is hereby transferred to the genus *Alona* Baird, 1843. *Alona dentifera* is the only species of the genus *Alona* lacking both major and lateral head pores in second juvenile and adult instar. Other distinctive characters of this species include exceptionally long basal spine of postabdominal claw, characteristic shape of head shield and postabdomen.

DISTRIBUTION. The Americas from the South of U.S.A. (Texas and Louisiana, see Dodds [1926]) to Argentina (Martínez de Ferrato [1966]).

Discussion

The morphology of *A. dentifera* from the Sars' collection completely agree with the descriptions of *A. brasiliensis* according to all subsequent authors [Smirnov, 1984; Rey & Vasquez, 1986]. As in juveniles reported by Elías-Gutiérres et al. [2001] from Mexico, instar I females of *A. dentifera* from Sars' collection have two connected major head pores, but lack them in adult state. To our mind, this confirms the synonymy of *A. brasiliensis* with *A. dentifera*. The morphology of head pores and trunk limbs of *A. dentifera* is typical for subfamily Aloninae, so the transfer of this species to the genus *Alona* is justified now.

In course of his revision of the family Chydoridae, David Frey [1967] listed three main differences of the subfamily Aloninae from the Chydorinae: (1) position of minor pores relatively to longitudinal axis of head shield; (2) type of mandibular articulation; (3) number of setae on exopodite IV [Frey, 1967]. Adult *Alona dentifera* lacks lateral (minor) head pores. However, two interconnected head pores in the juvenile female of instar I (reported first time by Elías-Gutiérres et al. [2001]) is clearly an alonine, not chydorine, character. Although there is a short projection for the mandibular joint in *A. dentifera*, which was not discussed previously for other representatives of the Aloninae, the former is closer just to Aloninae then to Chydorinae according to this character. Also, *A. dentifera* belongs to the subfamily Aloninae due to presence of only six setae on exopodite IV, instead of seven in the Chydorinae.

According to limb structure and morphology of all other body parts, this *A. dentifera* is a typical member of the tribe Alonini Kotov, 2000 of the subfamily Aloninae. The relationships of this species within the subfamily are not completely clear.

Some features of *A. dentifera* are outstanding not only for the genus *Alona*, but for the whole subfamily Aloninae. The lack of both major and minor (lateral) head pores is a unique combination for the subfamily, but there are examples of reduction of these structures within the subfamily [Smirnov, 1971]. The monotypic genus *Monospilus* Sars, 1862, for example, also lacks lateral pores. Masson & Amoros [1992] found numerous minute pores in *M. dispar* Sars, 1862, but a new SEM investigation did not confirm presence of these pores [Kotov, unpublished]. The genus *Monospilus* is very far phylogenetically from *A. dentifera*, so the reduction of lateral head pores should be regarded as an outapomorphy of *A. dentifera* among *Alona* and *Alona*-like genera. Another alonine genus, *Notoalona* Rajapaksa & Fernando, 1987, lacks major head pores. *Notoalona* is also not a congener of *A. dentifera*, so this character is also an outapomorphy of *A. dentifera* among *Alona*.

The head shield with evenly rounded anterior margin is rare for the alonines. In contrast, several genera of the subfamily have a characteristic, remarkably elongated, narrow rostrum. In species with a moderately or weakly developed rostrum, like many species of *Alona*, the central part of anterior margin is more or less protruding anteriorly, and the margin of the head shield is concave in lateral portion. The type of head shield of *A. dentifera* is found only in a few taxa, i. e. genus *Graptoleberis* Sars, 1862 from tribe Alonini, and *Indialona ganapati* Petkovski, 1966, a single member of the tribe Indialonini (see Kotov [2000b]). Again, for *A. dentifera* this character is an outapomorphy within *Alona*.

Significance of the type of mandibular articulation for the alonine systematics must be checked accurately. After Frey [1967: 33], it is accepted that mandible of an alonine "articulates at the point where the free margins of head and shell come together". We are sure that the short projection for mandible joint, which is found in *A. dentifera* in present study, is also characteristic for some other alonines, also clear in the head shield of *Euryalona orientalis* (Daday, 1898) [Frey, 1967: figure 8]. Previous authors never described this region in detail, following the general idea of Frey on the alonine mandible. So, we do not know what is a real appearance of mandibular articulation in each genus and species of the Aloninae.

A remarkably long basal spine (as in *A. dentifera*) was found previously in a sole species of the subfamily Aloninae, *Spinalona anophtalma* Ciros-Pérez & Elías-Gutiérrez, 1997. However, *Spinalona* is the most specialised genus of the Alonini, very distant from *Alona* [Kotov & Elías-Gutiérrez, 2002], so the extremely long basal spine is also an outapomorphy of *A. dentifera* among *Alona*.

On the other hand, there is nothing remarkable in the morphology of all trunk limbs of this species, its appears to be within the range of trunk limbs variability of *Alona* species. In addition, *Alona* is a member of a large group of alonines with minimal differences in number of elements in thoracic limbs [Kotov, 2000b]. Also morphology of the antenna I and II and armature and shape of postabdomen is not specific in *A. dentifera*.

At the first glance, a combination of unique and rare characters (discussed above) appears to be a reason for creation of a new genus. However, the outstanding characters of *A. dentifera* are in fact outapomorphies, reflecting the extreme specialisation of this species, and not optimal characters for creation of a new taxon. Creation of one more monotypic genus of the Aloninae, being based only on outapomorphies, should be avoided regarding the present state of systematics of the *Alona*-like representatives of the subfamily. We think it is better to wait for an investigation of the subfamily phylogeny basing on molecular methods, which can be very helpful in the resolving of recent problems of the alonine systematics. Still, *A. dentifera* is among "marginal" species of *Alona*, and their position within the genus can be excused for the time being only by possible artificial composition of *Alona*.

Smirnov & Santos-Silva [1995] described specimens from Roraíma, Brazil with three major head pores and six setae on exopodite IV, identified as *Alona dentifera*. But this form differs from *A. dentifera* s. str. in very long rostrum and shorter basal spine on the postabdominal claw. Taxonomic status of this animal remains unclear. It is obviously a member of the subfamily Aloninae, but only a detailed investigation of the trunk limb morphology may reveal its position within the subfamily, which seems closer related to *A. poppei*.

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